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ORIGINAL PAPER

Characterising the Sexuality and Sexual Experiences of Autistic Females

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Abstract

Current understandings of the sexuality of autistic females have been predominantly drawn from qualitative studies. This study aimed to quantitatively examine the sexual functioning of autistic females ($N = 135$), by comparing these to the sexual interest, behaviours, and experiences to 96 autistic males and 161 typically developing females. Autistic females reported less sexual interest, yet more experiences than autistic males. More autistic females also reported engaging in sexual behaviours that were later regretted, unwanted, or receiving unwanted sexual advances. Differences between autistic and typically developing females were significant. Results indicate that due to a mismatch between less sexual interest, yet increased sexual behaviours, autistic women are at greater risk of negative sexual experiences including victimisation and abuse than autistic men.

Keywords Autism spectrum disorder · Sexuality · Sexual functioning · Females · Women

Recent changes in sexual culture and attitudes towards the sexuality of individuals with autism have begun to challenge original misconceptions of sexuality and spark new research interest in the sexual functioning of this group (George and Stokes 2018; Kellaher 2015). Recognising a lack of knowledge in the field, emerging research has directed its attention to further understanding, and fostering the healthy sexual development of individuals on the spectrum. With a specific focus on the experiences that many individuals encounter in their pursuit of fulfilling sexual and romantic relationships, researchers have identified a number of unforeseen challenges that impact development and functioning across a range of sexuality domains. While the most apparent theme is an expressed interest in further understanding their own sexuality to develop relationships with others (Gougeon 2010; Pask et al. 2016); an equally cited observation is the negative impact that the defining traits of autism have on an individual's ability to pursue their desired sexuality in an appropriate way (Sullivan and Caterino 2008). Thus, research has revealed that the combination of intrinsic social and communication impairments, together with limited exposure to peer interactions often results in a presentation of less sexual knowledge, and fewer accurate sources of sexual education than TD peers (Stokes et al. 2007; Sullivan and Caterino 2008).

The complexities surrounding the sexuality of autistic individuals have been further compounded by the identification of sex differences in the diagnostic presentation (Halladay et al. 2015), and thus, experiences of sexuality between males and females. To date, three empirical studies have examined sexuality variables amongst autistic males and females independently (Byers et al. 2013a, b; Hénault and Attwood 2006). Although methodological shortcomings such as disproportionate sex ratios, variations in study methodology and poor power have constrained the validity of key findings, the most consistent and concerning conclusion amongst all three publications were the overall reduced levels of sexual and romantic functioning among autistic females. These included lower levels of sexual well-being, satisfaction and assertiveness, in addition to reduced sexual arousability, and less desire to engage in sexual behaviours compared to males either with autism or TD peers of both sexes. In addition to greater awareness of not fitting into the typical female profile and concerns surrounding the potential misinterpretation of the intentions of potential romantic

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interests (Attwood 2009), females also reported higher levels of sex-related anxiety, distress, and problems (Byers et al. 2013a, b; Hénault and Attwood 2006). Although in need of further exploration, these findings have been the first to provide highly needed information on the various sex-related issues and vulnerabilities that are unique to females within this group.

An additional factor that has contributed to the uncertainties that surround the sexuality of autistic females is the absence of any literature that has investigated female samples via quantitative means. To date, current understandings of the sexuality of autistic females have been drawn from a small number of clinical anecdotes and qualitative case reports (Attwood 2009; Cridland et al. 2014; George and Stokes 2016, 2018; Haracopos and Pederson 1992; Nichols 2009; Pecora et al. 2016). Although limited in scope and number, the findings have been consistent. In all reviewed studies, conclusions support the suggestions of poorer sexual and romantic functioning in autistic females, and have also uncovered striking themes of vulnerabilities to sexual victimisation (Kanfiszer et al. 2017). Specifically, these sources have identified that autistic females present with an increased risk of experiencing a range of adverse, and often unwanted sexual experiences than autistic males and TD counterparts. While these vulnerabilities include the naïve engagement in promiscuity as a means of initiating desired relationships, and poor choices of abusive romantic partners (Attwood 2007, 2009, 2013; Haracopos and Pederson 1992); more recent cases have also cited an increased susceptibility to sexual exploitation due to being both overly trusting, and more likely to misinterpret the sexual intentions of others (Cridland et al. 2014). Although preliminary, these observations suggest that autistic females may present with a profile marked by numerous sex-specific challenges and co-occurring vulnerabilities.

Despite providing important information on the sexual vulnerabilities of autistic females, the literature to date has been drawn from a mix of both adolescent (Cridland et al. 2014; Nichols 2009) and adult samples (Attwood 2007, 2009, 2013; Haracopos and Pederson 1992). While this has obscured understandings of the developmental trajectories of these females, knowledge of sexual development within this group remains unclear. While, with increasing age autistic males have been shown to acquire typical sexual experiences (Stokes and Kaur 2005; Dewinter et al. 2015; Ginevra et al. 2016), determining whether these trajectories are mirrored for autistic females may assist in identifying the age at which females may be most vulnerable. Thus, further research would be useful to determine the sexual developmental trajectories of females in this group.

The findings from reviewed studies have begun to provide much needed information on the sexual profile of autistic females. Despite this, significant gaps in current literature continue to places limits on current understandings of the experiences and sex-related challenges that are unique to this group. Consequentially, there remains a need for quantitative investigations that confirm and further characterise the sexuality of autistic females, while also gaining insight into the issues that surround the sexual development of this vulnerable group.

The objective of this study was to expand upon previously reviewed literature to quantitatively investigate the sexual functioning of autistic females. Specifically, this research aimed to examine the prevalence and nature of reported sexual interests, behaviours, and negative sexual experiences in autistic females; and the differences that may exist between autistic males and TD females. It was hypothesised that when compared to male counterparts and TD females, autistic females would report poorer overall levels of sexual functioning across all domains measured. Specifically, it was predicted that females would report less sexual interest, fewer sexual experiences, yet higher instances of negative sexual experiences than all comparison groups. Finally, it was expected that reported instances of negative sexual experiences would increase with age for all comparison groups.

Method

Participants

A total of 459 adults participated in this study. Of these, 227 were non-clinical TD individuals (describing their birth assigned sex as 66 males; 161 females [$M = 22.16$ years; $SD = 5.25$]); these included 62 adults who identified their gender as male, and 152 as female. 12 participants reported an 'other' gender identity. One TD participant did not report their gender. The remaining 232 individuals self-reported a formal diagnosis of High-Functioning Autism (HFA) or Asperger Syndrome (96 males; 135 Females; one unreported sex [$M = 25.13$ years; $SD = 7.96$]). Within these, 95 and 111 individuals reported a male and female gender identity respectively, with the remaining 26 participants identified as 'other'. Visual inspection of participants' sexual orientation indicated that a greater proportion of autistic females (68.9%) reported non-heterosexual orientations than autistic males (41.2%) and TD females (45.5%). Table 1 presents the reported sexual orientations of participants by diagnostic group and birth sex.

All participants completed the AQ (Baron-Cohen et al. 2001) as a screen for ASD, with the cut-off set at 32. All those assigned to the ASD group had scored that exceeded this criterion. Significant group differences in mean AQ scores were identified between the groups ($t_{(411.81)} = 14.79$, $p < 0.001$, $d = 1.39$), confirming higher levels of autistic

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Table 1 Sexual orientation of participants by diagnostic group and birth sex

Sexual orientation %	ASD ($N=231$)		TD ($N=227$)	
	Males ($N=96$) (%)	Females ($N=135$) (%)	Males ($N=66$) (%)	Females ($N=161$) (%)
Heterosexual	58.8	31.1	56.7	54.4
Homosexual	22.6	43.7	26.9	28.6
Bisexual	18.6	25.2	16.4	16.9

One autistic participant who did not report their birth sex was excluded from this analysis

symptoms in the clinical sample. Significant age differences were observed between the autistic and TD samples ($t_{(172.9)}=4.59$, $p<0.001$; $d=0.70$), where the mean age of autistic females ($M=26.2$ years, $SD=8.7$) was higher than females in the control group ($M=22.0$ years, $SD=4.6$). As similar recruitment methods were used for both the autistic and TD sample. No other demographic feature we collected discriminated between the groups, leaving the cause of the significant age differences unclear.

Materials

The Autism Spectrum Quotient ([AQ]; Baron-Cohen et al. 2001): Adult Version

The AQ is a screening tool that measures the degree of Autism-related traits in individuals 16 years or over. The questionnaire is a 50-item self-report measure, with all responses rated on a 4-point Likert scale ranging from 1 (*definitely agree*) to 4 (*definitely disagree*). Scores on all subscales are summed to create a total score (0–50), with higher scores indicating greater evidence of Autism symptomology. The authors of the AQ have purported a screening cut-off score of, or above 32, capturing 80% of individuals with Autism at a 2% false-positive identification rate (sensitivity = .95, specificity = 0.52).

The Sexual Behaviour Scale: Version 3 (SBS-III)

The SBS-III is a 236-item self-administered measure that examines reported levels of knowledge, attitudes, and behaviours across a range of social, sexual and romantic domains. The majority of items in each of the subscales require either dichotomous (*1 = yes, 2 = no*) responses, or ratings along a four (*1 = rarely, 4 = always*), five (*1 = not at all, 5 = extremely*), or six-point Likert scale (*1 = 1 sexual partner, 5 ≥ 10 sexual partners, 6 = none*).

Following initial psychometric evaluation and sub-scale refinement (Hancock 2018), nine of the 14 subscales within the SBS-III have been confirmed as valid and reliable measures of socio-sexual functioning in individuals with and without Autism. Within this study, all test items were drawn from the modified sexual behaviour (SB) subscale, which comprised of 25 items measuring the five components of (1) sex-related decisions and behaviours; (2) sexual interest; (3) negative sexual experiences interest; (4) misinterpretations; and (5) hugging. The results of Hancock's (2018) confirmatory factor analysis have found that fit indices for the single factor model for the SB subscale represent the data well, where sufficient correlations were identified for all items ($\chi^2/df=2.53$, RMSEA = .08; Hancock 2018). Each of the five components within the SB subscale demonstrate sound internal consistency ($\alpha \geq .70$), with subsequent Rasch analyses further supporting the reliability of this subscale (PSI = .69).

Procedure

Upon receiving ethical approval for the research (DUHREC 2014-270), participants were recruited via paid online advertisements, contact with National and international Autism awareness organisations, and support forums. Word of mouth and snowballing techniques were also used. All methods of data collection were conducted in electronic format.

After consenting to participate in the survey, participants then completed the online questionnaire which firstly comprised of a series of demographic questions. This was followed by the administration of the AQ, and then the SBS-III. The question was untimed, yet it was expected to take 30–45 min to complete.

Data Analysis

Data were screened for missing values, outliers, and multicollinearity. Data pertaining to each participant group were screened and evaluated independently. Following the exclusion of two cases that did not complete any subscales within the SBS-III, a total of 457 participants were retained. No outliers were identified in the dataset ($Z > \pm 3.29$; Tabachnick and Fidell 2007), and multicollinearity was not found in the variables to be analysed. As non-parametric procedures, such as the Chi square and Multinomial Logistic Regressions (LR) used do not have distributional assumptions (Tabachnick and Fiddell 2013), issues of normality were not considered as a cause for concern.

Analysis Design

To meet the aims of this investigation, a series of Chi square tests of independence were used to investigate the relationships between diagnostic status, biological sex, and each domain of sexual functioning. As previous research

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investigating sex differences in autistic populations has analysed participants according to their biological sex (Brown-Lavoie et al. 2014; Hénault and Attwood 2006), all comparisons in this study were drawn between participants based on their birth assigned sex, rather than gender identity. Such analyses were employed to undertake comparisons of three Independent variables (IV) of (1) diagnostic group; (2) biological sex within the clinical sample; and (3) diagnostic status within females. Analyses were undertaken over the dependent variables (DV) of sexual interest, sexual experiences and negative sexual experiences. Both diagnostic status (autism or TD) and biological sex (male or female) contained two levels. All measures of sexual functioning were drawn from the relevant items within the SBS-III that aimed to measure each DV under study. Comparisons were based on the reported frequency of 'yes/no' responses to these items according to diagnostic status and sex. While the purpose of this study was to compare levels of sexual functioning between autistic females and both autistic males and TD females, data for TD males were presented in all analyses for completeness.

Exploratory analyses comparing responses between autistic females and TD females as well autistic males (IV1: Diagnostic Group) on their reported instances of negative sexual experiences (DV) across age (IV2) were undertaken via a series of LRs. For these analyses responses were drawn from 'yes/no' responses from the three SBS-III items measuring these negative sexual experiences used in aforementioned Chi square tests. Age (IV2) contained three levels (18–30 years, 31–40 years, 41–56 years).

Results

Interest in Sex

To determine if autistic females display less sexual interest than autistic males and TD females, frequencies of expressed interest in sex and sexual behaviours were assessed between each of the comparison groups (Fig. 1). Level of sexual interest was examined by responses to the item 'I would like to have sex with others' drawn from the SB subscale within the SBS-III. Responses to this item contained the two response options of 'yes' or 'no'. Examination of sexual interest by biologically assigned sex within those with autism found a higher reported frequency of sexual interest amongst autistic males (85.4%) than autistic females ([72.6%] $\chi^2_{(1,N=231)}=5.36, p<0.05, OR=1.75$). Further analyses of frequencies of interest in sexual behaviour between autistic females (72.6%) and TD females (78.1%) were non-significant ($\chi^2_{(1,N=295)}=2.29, p=0.33, OR=1.38$). While these results lend support to the hypotheses that autistic

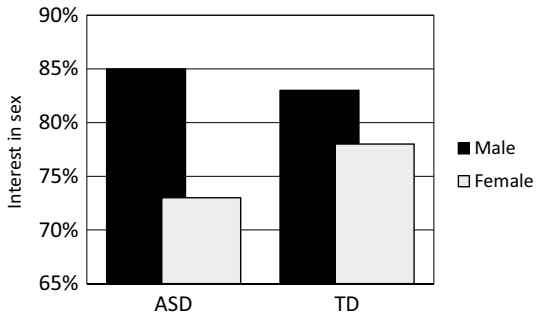

Fig. 1 Proportion of individuals within each diagnostic group and birth assigned sex who reported an interest in sex and sexual behaviours

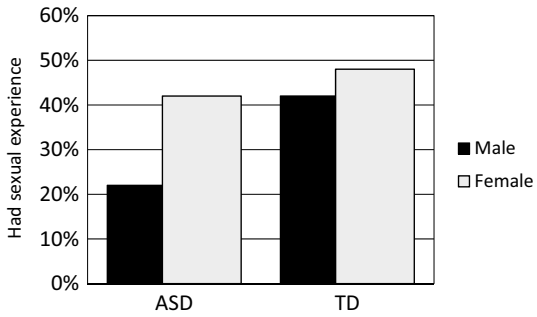

Fig. 2 Proportion of individuals within each diagnostic group and birth assigned sex who reported having some form of sexual experience

females are less interested in sex and sexual behaviours than autistic males, the comparable levels of sexual interest found between females with and without autism contradicts the predictions of differences between females in these groups.

Sexual Experiences

A series of Chi square tests of independence were performed to determine if autistic females reported fewer sexual experiences than autistic males and TD females. In order to measure incidence of sexual experience, frequencies of 'yes' or 'no' responses to the SBS-III item 'I have had some form of sexual experience', were examined across all comparison groups (Fig. 2). Significant differences were found between males and females within the clinical group ($\chi^2_{(1,N=231)}=8.41$, $p<0.05$, $OR=2.02$). This analysis revealed that 40% of females, yet 21.9% of males indicated having some form of sexual experience. No significant differences were found following comparisons of sexual experience in females with and without Autism ($\chi^2_{(1,N=295)}=2.27, p=0.36, OR=1.38$). Taken together, the hypotheses of autistic females reporting

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less sexual experience than both male counterparts and TD females were not supported by these findings.

Negative Sexual Experiences

Chi square analyses were undertaken to assess if autistic females were more likely to report being subject to a range of negative sexual than autistic males and TD females. Overall rates of negative sexual experiences were measured across three domains. These included the reported engagement in (1) sexual experiences that were later regretted; (2) unwanted sexual experiences; and (3) being the victim of an unwanted sexual advances or behaviours from others. To ensure that results were not obscured by responses of participants who had reported no sexual experience at all (Fig. 2), only participants that reported having some form of sexual experience ($n = 154$) were retained for these sets of analyses. This included 55 autistic females, 21 autistic males, and 78 TD females.

Sexual Experiences that were Later Regretted

To assess whether a larger proportion of autistic females would report having engaged in a sexual experience that was regretted at a later time, frequencies of these experiences were examined across comparison groups (Fig. 3). Such comparisons were based on the level of 'yes' or 'no' responses to the SBS-III item "I have agreed to have sex with someone and regretted it afterward". Chi square analysis revealed significant group differences between the males and females in the clinical group ($\chi^2_{(1,N=75)} = 5.09$, $p < 0.05$, $OR = 2.64$). Within these groups, 65.5% of autistic females experienced some form of regret following a sexual experience compared to 38.1% of males meeting a diagnosis. Differences in rates of regretted sexual experiences between the two female groups were not significant ($\chi^2_{(1,N=133)} = 1.79$ $p = 0.18$, $OR = 1.53$). These findings support to the hypothesis that the reported incidence of (later) regretted sexual experiences would be higher among females than males in the clinical group. However, comparable rates identified among females irrespective of diagnosis do not lend support the hypothesis predicting higher incidence of such experiences amongst autistic females than TD peers.

Engagement in Unwanted Sexual Behaviours

Further Chi square analyses were conducted to determine if autistic females were more likely to have consented to, and thus engaged in an unwanted sexual event or behaviour than males meeting a diagnosis and TD females. In order to examine this, comparisons were made against the frequencies of 'yes' or 'no' responses to the SBS-III item 'I have agreed to have sex with someone that I didn't really want to". Chi square analysis revealed that when compared to both autistic males ([33.3%] $\chi^2_{(1,N=75)} = 4.69$, $p < 0.05$, $OR = 2.55$), and TD females ([34.6%] $\chi^2_{(1,N=133)} = 8.39$, $p < 0.01$, $OR = 2.56$), autistic females (60%) were more likely to have consented to an unwanted sexual event. The results support the hypothesis that a larger proportion of autistic females would report engaging in unwanted sexual behaviours than both autistic males and TD females. Figure 4 presents percentage frequencies of consenting to unwanted sexual events or behaviours reported by males and females in both the clinical and control groups.

Experience of Sexual Victimisation: Victim of Unwanted Sexual Advances or Behaviours from Others

In order to determine if autistic females were more likely to have been the victim of an unwanted sexual advance or behaviour from another, reported frequencies of these experiences were assessed between comparison groups (Fig. 5). Responses were based upon the frequencies of 'yes' or 'no'

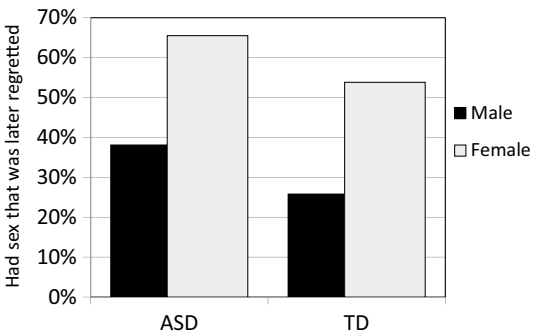

Fig. 3 Proportion of individuals within each diagnostic group and birth assigned sex who reported engaging in a sexual experience that was later regretted

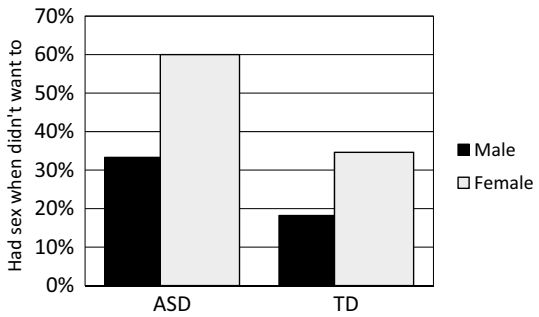

Fig. 4 Proportion of individuals within each diagnostic group and birth assigned sex who reported engaging in an unwanted sexual experience

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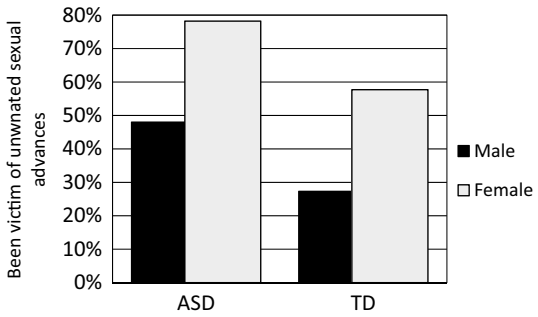

Fig. 5 Proportion of individuals within each diagnostic group and birth assigned sex who reported an experience of an unwanted sexual advance from others

responses to the SBS-III item "I have been the victim of unwanted sexual advances or behaviours from others". Chi square analyses revealed significant differences between autistic males and females ($\chi^2_{(1,N=75)} = 7.47$, $p < 0.01$, $OR = 3.34$), where 78.2% of females, yet 47.6% of males reported being subject to an unwanted sexual advance or experience. Differences between autistic and TD females (57.7%) were also significant, with females in the clinical group being 2.21 times also more likely to report these experiences than TD females ($\chi^2_{(1,N=133)} = 6.05$, $p < 0.05$, $OR = 2.21$). Thus, results support to the hypotheses that a larger proportion of autistic females would report being the subject of an unwanted sexual advance or behaviour from others than all comparison groups.

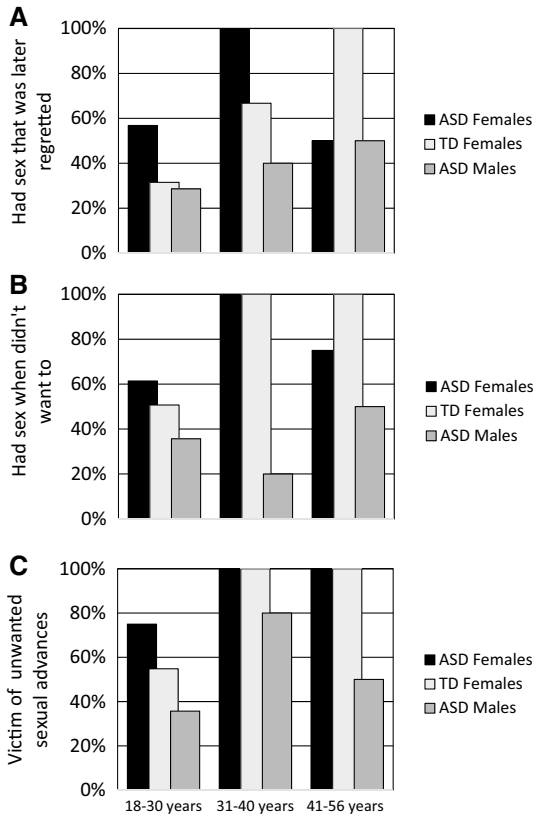

Fig. 6 Proportion of individuals within each diagnostic group and birth assigned sex who: **a** reported engaging in a regretted sexual behaviour; **b** reported engaging in an unwanted sexual behaviour; **c** reported an experience of an unwanted sexual advance from others

Exploratory Analyses: Negative Sexual Experiences across Sex in TD Sample

Exploratory Chi square analyses were undertaken to determine if the sex differences in negative sexual experiences that were observed in the autistic sample would also be mirrored in the TD group. Relative to TD males, TD females were 1.50 times more likely to have experienced an unwanted sexual advance than male counterparts ($\chi^2_{(1,N=106)} = 3.99$, $p < 0.05$, $OR = 1.50$). Differences in regretted ($p = .50$), and unwanted sexual experiences ($p = .56$) were not significant between males and females in the TD group.

Exploratory Analyses: Negative Sexual Experiences by Diagnostic Group and Age

Exploratory analyses were conducted to assess the effects of diagnostic status and age on reported rates of negative sexual experiences. Using the proportion of the sample who reported having some sexual experience ($n = 154$), frequency analyses were undertaken to compare the proportion of individuals within each diagnostic, and age group that reported engaging in a sexual behaviour that was (1) later regretted (Fig. 6a); (2) unwanted (Fig. 6b); as well as (3) experiences of unwanted sexual advances or behaviours (Fig. 6c). Visual inspection of frequency data revealed that a greater proportion of autistic females ($\geq 56.8\%$) reported experiencing at least one instance of each of the three negative sexual experiences than autistic males across all age groups ($\geq 20\%$). Within the 31–40-year-old age group, 100% of autistic ($n = 6$) and TD females ($n = 3$) reported experiences of both a regretted sexual behaviour, and unwanted sexual advances. Further comparisons between the two female groups found that all TD females within the 41–56-year-old age group ($n = 2$) reported each of the three negative experiences, compared to $\geq 50\%$ of autistic females. Greater proportions of each negative sexual experience were observed in the autistic female sample ($\geq 56.8\%$) in all remaining comparisons with TD females ($\geq 31.5\%$). Percentages of individuals within each diagnostic, and age group who reported instances of negative sexual experiences are presented in Table 2.

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Table 2 Reported proportion of negative sexual experiences across diagnostic group and age based upon birth sex of participants

	18–30 years $n=132$ (%)	31–40 years $n=14$	41–56 years $n=8$
Engagement in sexual behaviours that were later regretted			
ASD females	61.4	100	75.0
ASD males	35.7	20.0	50.0
TD females	50.7	100	100
Engagement in unwanted sexual behaviours			
ASD females	56.8	100	50.0
ASD males	28.6	40.0	50.0
TD females	31.5	66.7	100
Sexual victimisation: victim of unwanted sexual advances or behaviours from others			
ASD females	75.0	100	100
ASD males	35.7	80.0	50.0
TD females	54.8	100	100

Only participants who reported having had some form of sexual experience were included

Sexual Experiences that were Later Regretted by Diagnostic Group and Age

An LR analysis was conducted to assess whether there were differences in reported engagement in sexual behaviours that were later regretted across diagnostic group and age (Table 3). To allow for these comparisons, autistic female (IV1: diagnostic group) and 18–30 years (IV2: age) were used as reference categories. Analyses revealed that the overall model fit the data ($R^2_{LL}=0.34$, $\chi^2_{(4)}=12.16$, $p<.05$). Comparisons on different levels within the IVs and DVs revealed that instances of engagement in sexual behaviours that were later regretted differed according to diagnostic group ($R^2_{LL}=0.32$, $\chi^2_{(2)}=7.16$, $p<.05$). Autistic females were 4.48 times more likely to report engaging in a sexual behaviour that was later regretted than autistic males across all age groups ($p<.01$). Group differences in regretted sexual behaviours between autistic and TD females were non-significant ($p=.27$). Age-based comparisons also revealed significant differences overall ($R^2_{LL}=0.30$, $\chi^2_{(2)}=6.70$, $p<.05$). While the proportion of individuals reporting an instance of negative sexual experiences increased with age, significant differences were only found upon comparisons between the

Table 3 Multivariate logistic regression results comparing negative sexual experiences by diagnostic group and age based upon birth sex of participants

	N	B (SE)	OR	CI
Sexual experiences that were later regretted ($N=153$)				
Diagnostic group				
Autistic males	21	1.50 (0.59)**	4.48	1.42–14.16
TD females	78	0.42 (0.38)	1.51	0.73–3.16
Age (years)				
31–40	14	−1.56 (0.74)*	0.21	0.05–0.91
41–56	8	−1.17 (0.88)	0.31	0.06–1.76
Engagement in unwanted sexual behaviours ($N=153$)				
Diagnostic group				
Autistic males	21	1.44 (0.59)*	4.24	1.34–13.42
TD females	78	0.98 (0.38)**	2.67	1.28–5.56
Age (years)				
31–40	14	−1.48 (0.68)*	0.23	0.06–0.86
41–56	8	−0.91 (0.80)	0.41	0.09–1.93
Sexual victimisation: victim of unwanted sexual advances or behaviours ($N=153$)				
Diagnostic group				
Autistic males	21	1.97 (0.64)**	7.15	2.05–24.90
TD females	78	0.93 (0.41)*	2.52	1.12–5.71
Age (years)				
31–40	14	−2.64 (1.13)*	0.71	0.01–0.65
41–56	8	−1.78 (1.15)	0.17	0.18–1.61

Reference categories: autistic females ($n=54$; diagnostic group), 18–30 years (age)

*$p<.05$; **$p<.01$. Only participants who reported having had some form of sexual experience were included

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18–30 and 31–40-year-old age groups ($p < .05$). Results suggest that autistic females were more likely to report engaging in a sexual behaviour that was later regretted than both autistic males across all age groups, and TD females in the 18–30-year-old age group. The likeliness of reporting sexual experiences increased from 18–30 to 31–40 years among autistic and TD females. Trends in the 41–56-year-old age group decreased in the autistic female sample, yet continued to increase for autistic males and TD females.

Engagement in Unwanted Sexual Experiences by Diagnostic Group and Age

LR analyses of reported engagement in unwanted sexual behaviours across diagnostic group age identified significant differences overall ($R^2_{LL} = 0.40$, $\chi^2_{(4)} = 16.43$, $p < .01$). Diagnostic group was found to significantly predict engagement in unwanted sexual experiences ($R^2_{LL} = 0.40$, $\chi^2_{(2)} = 10.03$, $p < .01$). Relative to autistic males, autistic females were 4.24 times more likely to report having an unwanted sexual experience ($p < .05$). Autistic females were also 2.67 times more likely to report unwanted sexual behaviours than TD females ($p < 0.01$). Comparisons across age were significant ($R^2_{LL} = 0.25$, $\chi^2_{(2)} = 6.22$, $p < .05$), where individuals in the 18–30 year old age group were 0.23 times less likely to report engaging in an unwanted sexual behaviour than participants in the 31–40 year old age group ($p < .05$). While individuals in the 18–30-year-old age group were 0.41 times as likely than those in the 41–56-year-old age group to report an unwanted sexual experience, differences were non-significant ($p = 0.26$). Findings indicate that autistic females were more likely to report engaging in an unwanted sexual behaviour than autistic males in the 18–30, and 31–40-year-old age groups, and TD females across all age groups. In the autistic female sample, proportions of engagement in unwanted sexual behaviours increased to 100% in the 31–40-year-old age group, and then reduced to 50% in the 41–56-year-old age group. For both autistic males and TD females, proportions of participants reporting unwanted sexual experiences increased with age.

Sexual Victimisation: Experience of an Unwanted Sexual Advance or Behaviour from Others by Diagnostic Group and Age

Comparisons of reported experience of an unwanted sexual advances or behaviours from others across diagnostic group and age identified a significant model fit ($R^2_{LL} = 0.55$, $\chi^2_{(4)} = 21.51$, $p < .001$). Diagnostic group ($R^2_{LL} = 0.67$, $\chi^2_{(2)} = 11.69$, $p < .01$) was a significant predictor of reported experiences of sexual victimisation. Comparisons revealed that autistic females were 7.15, and 2.52 times more likely to report being the victim of unwanted sexual advances than autistic males ($p < .001$) and TD females, respectively ($p < .05$). The effect of age was significant overall ($R^2_{LL} = 0.67$, $\chi^2_{(2)} = 11.58$, $p < .01$), where participants in the 18–30 year old age group were 0.07 times less likely to report being the victim of an unwanted sexual advance than those in the 31–40 year old group ($p < .05$). While participants in the 18–30-year-old age group were 0.17 times as likely to report an experience of unwanted sexual advances than those in the 41–56-year-old age group, differences were non-significant ($p = 0.12$). Results suggest that autistic females were more likely to report an incidence of sexual victimisation than males of all age groups, and TD females in the 18–30-year-old age group. Increasing trends of experiences of unwanted advances from others were observed in both female samples. The likeliness of reporting unwanted advances from others increased from the 18–30 to the 31–40-year-old age group, and reduced from 41 years for autistic males.

Discussion

The objective of this study was to quantitatively explore the sexual functioning of autistic females. Specifically, this research aimed to investigate the prevalence and nature of sexual interests, sexual behaviours, and negative sexual experiences within this group; while also drawing comparisons of these variables against autistic males and TD females. In line with the preliminary insights drawn from reviewed literature (Byers et al. 2013a; Kanfiszer et al. 2017), it was hypothesised that autistic females would report (1) less sexual interest, (2) fewer sexual experiences, and (3) higher instances of negative or unwanted sexual experiences than both male counterparts and TD females. While significant differences were cited across a number of key variables and comparison groups, there were also a number of instances where female scores on measured domains were higher than those of autistic males, or comparable to those cited with TD females. As such, the findings lend partial support to each of the three sets of hypotheses that comprise this study, and the overall hypothesis that autistic females present with poorer levels of sexual functioning than autistic males and TD counterparts.

The first set of hypotheses predicting lower levels of sexual interest in autistic females when compared to autistic males and TD females were partially supported. While the expectation that autistic females would report lower levels of sexual interest than male counterparts was confirmed, reported interest in sex and sexual behaviours was comparable amongst females irrespective of diagnosis. While sex differences in levels of sexual interest have not been

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exclusively examined within autistic populations, this result aligns with Byers et al.'s (2013a, b) identification of lower levels of sexual arousability and less desire for both solitary and dyadic sexual activity in high-functioning females. The sex differences found in levels of sexual interest also mirror both traditional gender roles and extensive sexuality literature within the TD population (Peplau 2003; Petersen and Hyde 2010), which consistently reports higher levels of sexual interest in males across cultures and all stages of the lifespan. The combined results suggest that both levels of interest in sexuality and relationships, as well as sex-specific trends of such interests, are likewise, as they appear within the TD population.

Study findings did not support the hypotheses predicting a lower prevalence of self-reported sexual experiences in amongst autistic females than both autistic males and TD females. Although significant sex differences between the number of autistic males and females who reported having some form of sexual experience were observed in this study, the direction of these differences contradicted that of the proposed hypotheses. Although initial predictions expected a greater percentage of males to report having some form of sexual experience, this increased proportion was instead observed amongst females in this group. Higher incidence of sexual experiences in females has also been cited in previous literature. Although limited to a single study that contained nine female participants, Hénault and Attwood's (2006) research on sex differences in high-functioning individuals also cited more reported sexual experiences in their female sample. Despite this, this finding does conflict with levels of sexual behaviour in the TD population, which are significantly higher in males of all age groups (Chandra et al. 2011; Gökengin et al. 2003). Although further exploration may work to identify an explanation for these differences, it is possible that features of autism in either males or females may be partially responsible for the inconsistencies found between groups.

The hypothesis predicting fewer reported experiences among autistic females when compared to TD females was likewise, not supported. In this study, comparable levels of sexual experience were reported by females with and without autism. To date, research is yet to investigate the level of, and frequency of sexual experiences and behaviours in autistic versus TD females alone. However, this finding does query the extent that the expressed feelings of disinterest in sex, as well as the negative responses from potential romantic partners cited in anecdotal accounts (Kanfiszer et al. 2017), are shaping the sexual experiences for these females. Results therefore suggest that, despite expressing both less personal interest in sexuality and perceived disinterest from potential sexual partners, autistic females are engaging in sexual behaviours at comparable levels to their TD peers. Thus, it appears that there is a mismatch between the level of sexual interest, desire, and sexual behaviours for some autistic females. Moreover, if these females are engaging in more sexual behaviours than their level of interest in sex would indicate, there may be a number of underlying mechanisms driving sexual behaviour in this group. While it is possible that females may be engaging in sexual activity to reduce reported social exclusion (Kanfiszer et al. 2017); the potential of sexual victimisation or coercion acting as a drive behind these behaviours should not be ignored (Bush 2016). Thus, these results not only highlight the significant need for further research that investigates the prevalence and nature of sexual experiences in this group, but also the motives behind female sexuality and engagement in sexual behaviours.

The findings of this study provided support for the set of hypotheses predicting higher instances of regretted, and unwanted sexual experiences in autistic females following comparisons to autistic male counterparts. In line with these predictions, autistic females were more likely to: (1) have engaged in a sexual behaviour that they later regretted, (2) consented to an unwanted sexual event, and also (3) report being subject to an unwanted sexual advance or experience. To date, literature is yet to quantitatively examine the prevalence of unwanted or adverse sexual experiences in autistic adults. However, these observations are consistent with reviewed literature that likewise point to an increased vulnerability to sexual victimisation, abuse, and exploitation among autistic females (Attwood 2009; Bush 2016; Cridland et al. 2014; Haracopos and Pederson 1992; Nichols 2009).

The sex differences in unwanted sexual advances also mirror those in the TD sample, which also observed higher rates of unwanted sexual advances amongst the TD female group. Despite this, comparable rates of regretted and unwanted sexual experiences between TD males and females in this study contrast against the higher rates of these experiences among autistic females. The results of this study suggest that within autism, sex differences in unwanted sexual advances are similar to trends observed in TD counterparts. As broader TD research cites an increased prevalence of sexual victimisation (Stoner and Cramer 2017), and unwanted sexual activity among females (Basile et al. 2007), the higher rates of regretted, and unwanted sexual behaviours in the autistic female sample also align with patterns in the wider TD population. However, as the trends observed between TD males and females in this study contrast against evidence of an increased risk to victimisation in TD females (Basile et al. 2007; Stoner and Cramer 2017), exploring the links between biological sex, and risks of negative sexual experiences in both autistic and TD groups is still necessary.

The set of hypotheses predicting higher instances of regretted and unwanted sexual experiences in autistic females when compared to TD females were partially supported. In support of study hypotheses, autistic females

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were more likely to report unwanted sexual experiences, and advances from others than TD females. Although research examining these variables using exclusive female samples is currently limited to two publications, the increased rates of unwanted sexual experiences amongst autistic females are consistent with higher incidence of unwanted sexual contact and coercion (Brown-Lavoie et al. 2014), as well as the increased proportion of life-time instances of sexual victimisation cited in autistic females (64%) following comparisons with same-sex TD groups ([53%] Bush 2016). The increased rates of unwanted sexual experiences and advances identified in this study, and previous research (Brown-Lavoie et al. 2014; Bush 2016) are concerning. They highlight a sexual vulnerability that may be specific to autistic female populations, and increased sexual risks that should be addressed to keep them safe. However, before means of reducing rates of unwanted sexual experiences can be developed, understanding the reasons why females are at such an increased risk is imperative. As such, identifying the causal factors that are contributing to these increased vulnerabilities may be the first step in reducing the risks and negative outcomes cited in this study.

Despite this, rates of regretted sexual experience were comparable between the two female groups. While these outcomes do not support the contention that autistic females are subject to more regretted sexual experiences than TD females, given that rates of sexual victimisation, assault and abuse are often underreported by autistic individuals (Gammicchia and Johnson 2014), it is possible that the total prevalence of these incidences have not been fully captured in this study. Consequentially, it remains unclear whether the lack of significant differences between the groups may be a reflection of true similarity in the regretted experiences of females with and without autism, or if an unidentified factor may be shaping the responses and rates of reported experiences by participants in this study. Thus, these findings are inconclusive, and should be interpreted cautiously alongside the conflicting observations cited in aforementioned publications, and the acknowledgement of the lack of available research examining these variables within female-only groups (Brown-Lavoie et al. 2014; Bush 2016). Hence, further exploration of these issues is required to determine both the nature and prevalence of adverse and regretted sexual experiences for these females, as well as the extent that biological sex, together with autism symptoms, may be acting as risk factors for a range of problematic sexual-health outcomes.

The final set of exploratory hypotheses predicting greater instances of reported negative sexual experiences across diagnostic group and age were partially supported. In line with study hypotheses, autistic females were more likely to report engaging in a (1) sexual behaviour that was later regretted, (2) an unwanted sexual behaviour, or (3) being the victim of unwanted sexual advances or behaviours than autistic males across all age groups. Autistic females more likely to have engaged in an unwanted sexual behaviour than TD females in 18–30, and 31–40-year age group, while also being more likely to have experienced an unwanted sexual advance than TD females in the 18–30-year-old age group. Results suggest that identifying as a young, autistic female may contribute to the increased prevalence of unwanted sexual experiences, reported by autistic females in both this, and other studies (Cridland et al. 2014; Kanfiszer et al. 2017). While further research investigating the impact that autism status, and female sex, may have on risks of experiencing sexual victimisation both independently, and is still necessary; unravelling the links between these variables is pertinent for the health and wellbeing of autistic females.

Exploratory analyses investigating the effects of age on rates of negative sexual experiences partially supported study hypotheses. Increasing age was a significant predictor of incidence of negative sexual experiences from 18 to 40 years for both female groups. However, reduced proportions of regretted and unwanted sexual experiences in older age groups ($\geq$41 years) within the autistic female sample questions the extent to which increasing age, rather than cohort, may be a factor leading to the risks and vulnerabilities of autistic females. Despite this, a continuous trend of increased engagement in regretted sexual behaviours and experiences of unwanted sexual advances with age was observed in the TD sample. There are a number of potential explanations for the differences in developmental trends observed in these analyses. Following examination of demographic trends within the sample, a larger proportion of autistic females (69%) reported a homosexual, or bisexual sexual orientation than both autistic males (41%) and TD females (46%). Within broader sexuality research, differences in sexual development and milestones have been observed between individuals identifying with Lesbian, Gay, and Bisexual (LGB), and heterosexual sexual orientations (Rosario et al. 2006). This literature also cites a greater history of negative and unwanted heterosexual interactions that were engaged in prior to the establishment of an exclusive LGB orientation amongst non-heterosexual females (Harrison et al. 2008). While the nature of negative experiences were not recorded in this study, it is possible that the higher proportions of autistic females reporting these experiences may be due to these identifying with LGB sexual orientations and reflecting on negative aspects of prior heterosexual encounters. An additional factor that may shape these findings was that the analyses of participants in the 41–56-year-old age group were conducted on only 8 cases. As such, the reduced proportion of autistic individuals reporting negative experiences may also be an artefact of the small sample examined in this study. Finally, the potential for autistic and TD individuals to follow developmental patterns and

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experience sexual behaviours differently may also be a factor shaping these observations. Given that little is known about the sexual and identity development of autistic females, confirming these trajectories and the impact this may have on sexual risks and negative behaviours may clarify these findings.

Strengths and Limitations

This study has worked to provide some highly-needed information on the sexual functioning and sexuality of autistic females. Being one of the few sexuality studies to focus on female's self-reported experiences, this research has begun to identify the range of complex developmental challenges and increased sexual vulnerabilities that are unique to females. As such, it acts as a preliminary step in understanding factors that may interfere with the health and wellbeing of this diagnostic group. In addition to its strengths and contribution to current literature, this study should also be considered in light of its limitations. While the online nature of the study did allow for the recruitment of a large, cross-cultural sample, this also saw that Autism diagnosis was self-reported. Although the average AQ score of participants within the clinical group ($M = 35.23$) was above Baron-Cohen's (2001) stringent cut-off (> 32), and thus indicative of an Autism diagnosis, formal diagnostic assessments were not conducted in this study. Despite this, as participants that self-reported an Autism diagnosis were also required to state the medical professional to which this diagnosis was formally obtained, it is likely that individuals in this group would be representative of those who have met current diagnostic criteria for autism spectrum disorder (American Psychiatric Association 2013).

Implications and Future Directions

The results of the current study also carry important implications for clinicians, researchers and significant others who provide support and education to females on the Autism Spectrum. Of particular concern, is the lack of quantitative studies investigating exclusive female groups, that have placed limits on the establishing a thorough understanding of the sexual functioning of autistic females. As such, more research is required to determine how these females come to arrive at their sexual identity, and the impact that this has on the prevalence and nature of their sexual interactions and romantic relationships. Moreover, while the high rates of negative, and unwanted sexual experiences cited in this study are a cause for concern, the motives driving the engagement in such behaviours remain unknown. As such, further research is required to determine the type of victimisation, abuse or exploitation that autistic females are being subject to, in addition to identifying the specific characteristics that are making them vulnerable to these negative experiences.

In addition to these issues, this study has highlighted the immediate need to address the increased sexual risks to negative sexual experiences that autistic females are subject to. As targeted interventions that focus on the sexual development of autistic individuals are currently limited, there is no current service or program specifically designed for females (Ballan and Freyer 2017; Visser et al. 2015). Consequently, the support needs of autistic females are not being met by existing sexual health and education frameworks. Thus, results of this study further support consistent recommendations for both clinicians and professionals to increase the level of, and access to, sex-specific sexuality education for females on the spectrum (Byers and Nichols 2014; Byers et al. 2013a; Cridland et al. 2014). It is suggested that effective collaboration between teachers, support providers, and clinicians, could act as the first step toward the development of specialised sex education services that are specifically tailored toward the unique concerns of autistic females. Although further research is required to determine the best practices of proactive intervention, preliminary literature suggests that programs that aim to provide normative information, enhance self-awareness, and foster positive attitudes toward sexuality would be the most effective (Ballan and Freyer 2017; Brown-Lavoie et al. 2014). Thus, by educating and empowering females with the knowledge and skills to make informed choices about their sexual behaviours, education can serve as a preventative tool to help females resist against negative sexual experiences, and reduce the risk of sexual victimisation and associated vulnerabilities cited in this study.

Conclusion

This study has offered some initial insight into the sexual functioning and sexuality of autistic females. The findings have identified a range of complex challenges that many of these females experience as they attempt to explore their sexual identity, maintain desired relationships, and pursue a sexuality that best meets their needs. They have also raised some immediate concerns in regards to the increased risk to a range of sexual vulnerabilities and adverse sexual experiences that females on the spectrum are subject to. Despite this, a thorough understanding of the prevalence, nature, and cause of these increased risks is still required. Thus, the findings provide foundations for future quantitative investigations examining the sexual functioning and associated experiences of autistic females, while also informing the development of treatment protocols that aim to overcome these challenges and enhance the sexual health and wellbeing of this vulnerable group.

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Author Contributions LAP and MAS conceived the study and its design. LAP and GIH developed and validated the instrument used to conduct this study. LAP and GIH carried out all data collection and data cleaning procedures. LAP conducted data analysis; wrote all drafts of the manuscript. MAS & GBM supervised development of work; edited, and reviewed all drafts; provided statistical guidance, and verified all statistical methods and results. MAS acted as corresponding author. All authors read and approved the final manuscript.

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Compliance with Ethical Standards

Conflicts of interest The authors declare that they have no conflict of interest.

Research Involving Human Participants and/or Animals All procedures performed in studies involving human participants were in accordance with the ethical standards of the Deakin University Human Research Ethics Committee (DUHREC 2014-270), and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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